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COMMUNICATIONS

CHANGES IN THE FUNDUS OCULI FOLLOWING SPLANCHNECTOMY IN MALIGNANT HYPERTENSION

BY

FRED T. TOOKE *and* J. V. V. NICHOLLS

MONTREAL

FIFTEEN cases of malignant hypertension treated by supradiaphragmatic splanchnectomy are reported. From every standpoint, including that of the fundus oculi, two were cured, three markedly improved, eight moderately improved and one unchanged. However, the improvement in the fundus oculi was the most dramatic.

In June, 1937, a presentation was made to the members of this Section entitled " Essential cardiovascular hypertension as revealed in examination of the fundus oculi."[1] It may be remembered that a general survey of something like 400 cases of hypertension occurring in the wards of the Royal Victoria Hospital, Montreal, was made and of these, 100 cases were put aside as representing clinically and ophthalmoscopically a classification known as essential hypertension. A certain number of these represented a series

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From the Department of Ophthalmology, Royal Victoria Hospital, Montreal.

relatively malignant in character, sometimes by the picture revealed in the fundus oculi, at other times through the alarmingly high blood pressure which the routine clinical examination brought out. Frequently the two went together, but it did not of necessity follow that the two had to occur together. In these cases of so-called malignant or relatively malignant form, the ophthalmoscopic picture varied from those cases which seemed to be free from any hypertensive lesion to others where oedematous changes in the fundus were so intense that retinal details could only be made out with the greatest difficulty. Certain patients selected as suitable for surgical consideration were transferred to the Department of Neuro-surgery where operative interference was instituted after consultation with members of the staff of that institution. We have attempted after a reasonable delay following operation to repeat our former examination, not only recording the ophthalmoscopic picture, but also the blood pressure, the state of the blood chemistry and one or two other details, comparing them with those recorded before operative measures were undertaken.

Something like 20 cases were operated upon and of these, 15 are now being reviewed. The whole number now being taken into consideration were simply reported *seriatim* and not selectively. Those omitted were unable to attend through a residence remote from the city which made their attendance a hardship.

We have been fortunate in obtaining the eye of one patient suffering from malignant cardiovascular hypertension who was deemed unsuitable for operation owing to her age and to the extent of renal involvement. A brief clinical summary as well as the pathological findings show us what subsequently we have to anticipate in both these realms of consideration in the cases which are to follow.

Mrs. H. S., aged 51 years, married and the mother of ten children, was admitted to the Royal Victoria Hospital in February 1937, and died about three weeks later. Her condition was diagnosed as one of "malignant hypertension with hypertensive heart disease and nephritis with generalised arteriosclerosis." Her blood pressure on admission was *280/140*, with 2 plus albumen and a trace of sugar in the urine. Strangely enough, her creatinine on admission registered only *1·42* mgms. per cent., and non-protein nitrogen only 26·6 mgms. per cent. These two, however, increased rapidly, so that the day before death creatinine registered 14·2 mgms. per cent., and non-protein nitrogen 286 mgms. per cent. These two signified very definite renal involvement associated with the arteriosclerosis and the essential cardiovascular hypertension.

The patient was seen by the neuro-surgeons who deemed that a splanchnectomy was not to be attempted owing to her age and also on account of the renal involvement.

Her fundi were examined shortly after admission and the picture revealed was described as follows: "One seldom sees a more intense degree of neuro-retinal oedema. The disc is so swollen that there is absolutely no sign of its margin, and the lamina cribrosa is completely filled in. The veins, as they emerge, are terribly engorged, tortuous and buckled, practically at every point where crossed by the arteries, while the arteries themselves are definitely contracted. Lymph exudates as well as haemorrhages cover the walls of the arteries as they emerge from the

disc, and numbers of flame-shaped haemorrhages follow the vessel walls and are also scattered indiscriminately throughout the retina. The retina about the macular area in both eyes is one large lymph plaque, while there are other deposits of lymph scattered throughout the oedematous membrane at too many points to specify."

The patient was seen repeatedly up to one day prior to her death. An autopsy was performed which revealed a genuine productive nephritis, hypertrophy of the

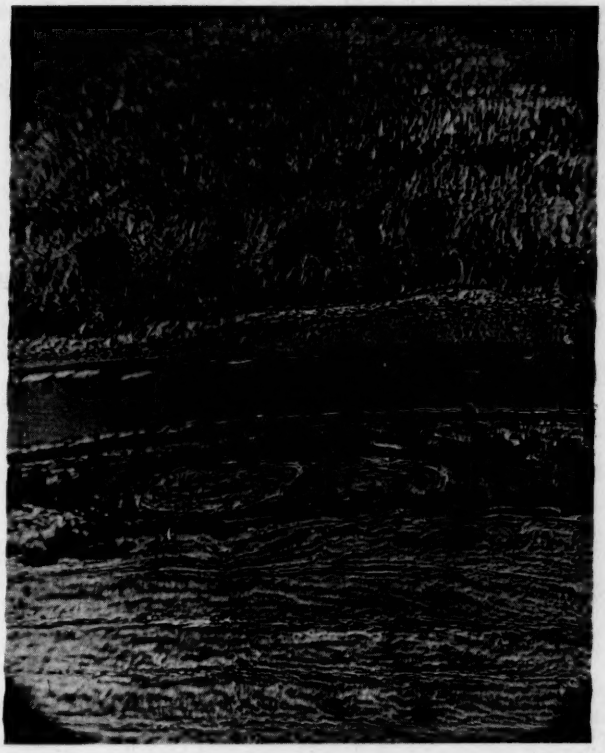

FIG. 1.

Shallow detachment of the retina from choroid. Atheromatous changes in vessels almost up to a point of occlusion. Degenerative changes in choroidal pigment. Multiple haemorrhages between internal and external granular layer of the retina.

heart, productive pleurisy, haemorrhagic oedema of the lungs, generalised hypertrophic arteriosclerosis, petechial haemorrhages in the colon, bladder, renal pelvis, ureter and stomach.

A brief description of the pathological changes occurring in the eyeball are as follows: The cornea, sclera, anterior chamber, iris, ciliary body and lens were normal. The choroid showed patchy collapse and engorgement. In the latter areas there was much serum exudate in which a few leucocytes could be seen.

Over these latter areas the retina and pigment epithelium showed a shallow detachment caused by the same type of exudate. The retina here and there showed small haemorrhagic extravasations into the deeper layers. (Fig. 1.) One area was very large being about 100 micra in diameter; in another area the same picture could be seen in a healing stage. The haemorrhage had been resorbed and the retinal layers could no longer be recognised as such, but were largely replaced by glia and fibrous tissue. In general, the retina showed patchy degeneration of the rod and cone layer, marked by pyknotic changes in the nuclei and loss of the outer limbs. There was marked cystic degeneration of the outer reticular layer in the region of

FIG. 2.

Definite oedematous changes in optic nerve itself as well as on surface of disc. Central vein dilated, with extravasation of leucocytes or perivasculitis along vessel wall, lamina cribrosa gradually being filled in.

the ora serrata. The retinal arteries were markedly thickened and in some places showed hyalin degeneration of their coats, and were more deeply placed than they should be in the region of the optic disc. The retinal veins were engorged. The vessels of the choroid showed a marked degree of arteriosclerosis (Fig. 1).

The swelling of the nerve head seen before death ophthalmoscopically was due to oedema and shallow detachment of the retina about the optic nerve (Figs. 2 and 3). The oedema was of marked degree as it contained numerous leucocytes, and the outer layers of the retina had degenerated.

Such, of course, is an extreme picture, but it may in some measure assist us in appreciating clinically the following series of cases which we are attempting to describe in detail where operative intervention was instituted after the cases had been carefully considered from a surgical standpoint.

Case No. 1, male, aged 36 years. Blood pressure 220/140. Pre-operative fundus examination: "Both fundi suggest rather an early phase of retinal arteriosclerosis. The light reflex on the arterial wall is very distinct while the smaller arteries are contracted. Both the smaller arteries and veins as they approach the capillary type are disposed to be tortuous. There is distinct evidence of buckling on the part of the superior temporal vein in both eyes where the arteries cross them." Post-operative fundus examination: 698 days following operation. "Right eye: The arteries are markedly contracted, more particularly the small ones. The arterial walls are highly refractile, especially close to the nerve head. The veins are very

FIG. 3.

Shallow detachment of retina, generalised pigmentary degeneration of choroid. Splitting or separation of fibres of Müller almost up to the nerve fibre layer particularly well shown with extravasation of lymph between these fibres.

definitely engorged and tortuous with very marked buckling where the smaller contracted arteries cross them; note particularly the right superior temporal vein. There are quantities of lymph plaques, some distributed relatively close to the disc margin below, another one about two discs' diameter above at a point where a vein is buckled by a smaller arteriole. Left eye: Shows arteries in many respects comparable to those of the right eye, but perhaps with not the same degree of sclerosis. The veins are engorged but not quite so tortuous, with buckling of the superior nasal vein about two discs' diameter from the disc margin. There are no lymph plaques in this eye, and no haemorrhages in either eye. Vision 6/6 in each eye." Blood pressure 210/150.

Case No. 2, female, aged 28 years. Blood pressure 228/140. Pre-operative fundus examination: "There is quite a definite blurring about the nasal as well as

FIG. 4.

Large psammoma body in pia arachnoid sheath of the optic nerve. In appearance it simulates an advanced condition of arterial sclerosis with endarteritis obliterans.

about the upper margin of the nerve head. The smaller vessels in this neighbourhood are apparently covered with lymph exudate. The laminae cribrosae are not sharply outlined. The arteries may possibly be contracted but the veins are not engorged or tortuous or grooved where the arteries cross them." Post-operative fundus examination 639 days following operation: "Right eye: There is a slight increase in the light reflex along the arterial walls, but hardly what one would describe as a generalised contracture of the vessels, although some of the smaller branches are certainly so disposed. The veins are somewhat engorged, as one would expect to find in this type of individual with her body weight; but no degree of buckling is discernible. There are no haemorrhages or lymph exudates. Left eye: Manifests precisely the same picture, and were one not put on one's guard, one would describe it as normal. Vision in each eye 6/6 partly, with correction." Blood pressure 120/80.

Case No. 3, female, aged 51 years. Blood pressure 280/145. Pre-operative fundus examination: "The right eye shows very definitely cardiovascular changes. The arteries are very markedly contracted and their walls are highly refractile. The veins are tremendously engorged and tortuous and dipped at many points where the arteries cross them. At the upper margin there is a large plaque of lymph exudate covering the vessels. It is so absolutely defined that it is almost suggestive of an area of persistent medullary sheaths. The rest of the disc margin is clear. In the left fundus the disc as such can be clearly outlined but the whole retina is such a mass of oedematous change that it is practically impossible to describe it. There is hardly a portion of retina proximal to the optic disc that one can recognise

as such, and being free from lymph exudate. The whole of the macular area is simply one enormous conglomerate mass of greyish-white oedematous change extending over this and away beyond the actual adjacent area. There are no haemorrhages in either eye." Post-operative fundus examination—440 days following operation: Right eye: "The arteries are generally sclerosed and the veins are engorged and tortuous. They are buckled close to the nerve head above. There is a blurring of the upper margin of the disc at about '11 o'clock,' caused by a very large plaque of lymph exudate with which is associated a haemorrhage. The macular area is clear. Left eye: shows a complete block of the inferior temporal artery. The veins throughout are generally engorged and tortuous, with multiple buckling. There are characteristic white lines along the course of the inferior temporal veins. The arteries are generally sclerosed and tortuous. There is a large plaque of lymph with pigmentary change close to if not directly at the macular area. There is also one large plaque of lymph exudate less than one disc diameter from the disc margin, above and to the nasal side. There are also a few mottled lymph plaques fairly close to the nerve head at the nasal side below." Right vision 6/6. Left vision—fingers at 4 metres. Cannot get fingers at 1 metre above mid-line. Blood pressure 200/140.

Case No. 4, female, aged 49 years. Blood pressure 260/140. Pre-operative fundus examination: "There is a well marked papillitis of both eyes with marked tortuosity of veins and contraction of arteries. Numerous recent small flame-shaped haemorrhages around the nerve head and throughout the fundi. The macular area seems free from involvement. Small scattered, round, dark areas of older haemorrhages in temporal region. No atrophy of the retina. Two subsequent examinations upheld these findings." Post-operative fundus examination—330 days following operation: "A most startling manifestation for the better in both fundi is apparent. Naturally the veins, as formerly, are definitely tortuous and nicked or notched at numbers of places where crossed by the arteries, as formerly noted. It is equally true that the arteries manifest their former contracted sclerosed condition; but absolutely no manifestation of loss of compensation is apparent in the presence of either haemorrhages or of lymph exudates which were so clearly evident prior to her operation. A month or two ago the residue of this loss of compensation could be seen as relatively small stippled lymph plaques at the temporal side of each nerve head. These have now completely disappeared. Vision, right eye 6/36, which has always been amblyopic, associated with convergent squint. Vision, left eye 6/9. Both eyes are highly astigmatic." Blood pressure 270/110.

Case No. 5, female, aged 36 years. Blood pressure 220/150. Pre-operative fundus examination: "Right eye—there are two patches of white exudate just temporal to the disc and above the macula. They are along a ciliary retinal artery. There are a couple of small haemorrhages along the macular branch of the inferior temporal vein, with a white patch of exudate beside them. The calibre of the superior nasal artery varies. The disc margin is blurred. Left eye—there is blurring of the disc margins. The arteries are very narrow, the veins fairly wide with variation of calibre, especially marked in the inferior temporal artery. There are no haemorrhages and no patches of exudate." Post-operative fundus examination—345 days following operation: "Right eye—blurring about vessels at upper nasal side of disc margin. Tiny pinhead patch of lymph exudate along the superior temporal artery about two discs' diameter from the disc margin. The veins may possibly be somewhat engorged with a moderate indication of nicking by some of the small arterial capillaries relatively close to the margin of the disc. Vision 6/6 in each eye." Blood pressure 260/140.

Case No. 6, female, aged 43 years. Blood pressure 182/114. Pre-operative fundus examination: "The arteries are a little narrow and there is decided pitting or compression of the inferior and superior temporal vessels in the left eye. The transparency of the vessels seems good. I should think from the picture that this is a straight case of hypertension of a very long standing." Post-operative fundus examination: 87 days following operation. "There is a moderate degree of tortuosity of the veins. They are not engorged or buckled. The arteries are possibly

slightly thinner than normal. If one had no information on her medical condition one would have said the fundi were normal." Vision 6/6 in each eye. Blood pressure 210/130

Case No. 7, male, aged 53 years. Blood pressure 210/130. Pre-operative fundus examination: "There are absolutely no signs in either fundus of localised cardio-vascular hypertension. The discs are sharply outlined and of good colour and the veins are not engorged, tortuous or buckled. The arteries, both large and small, show no degree of contraction, and the light reflexes on their walls show no evidence of exaggeration. There are no haemorrhages or lymph exudates." Post-operative fundus examination—455 days following operation: "Right eye—disc of good colour and sharply defined. The veins are somewhat engorged and slightly tortuous, but not nicked at any point. The arteries have no heightened reflex on their wall and they do not appear to be contracted. Would be pronounced as normal had he presented himself otherwise. No haemorrhages or lymph exudates. Left eye—the same statement holds for this eye." Vision 6/6 partly in each eye. Blood pressure 220/135.

Case No. 8, male, aged 30 years. Blood pressure 172/120. Pre-operative fundus examination: "The right eye is definitely myopic and the left eye is hypermetropic. No changes in the fundi except possibly secondary anaemia." Post-operative fundus examination—505 days following operation: "Right eye—an absolutely clear view of the right fundus is somewhat inhibited from what appears to be an anterior polar cataract, of course, congenital or immediately post-natal in origin. There is no manifest scarring of the cornea as far as one can visualise. On looking around this opacity in the lens the details of the fundus appear to be absolutely clear and normal. Left eye—the fundus is normal in all details." Vision—right eye amblyopic, convergent squint, anterior polar cataract. Vision, left eye 6/6 with correction. Blood pressure 170/100.

Case No. 9, male, aged 46 years. Blood pressure 204/160. Pre-operative fundus examination: "Physiological cupping of the discs which are clearly outlined. The retinal vessels appear normal. No haemorrhages or exudates." Post-operative fundus examination—425 days following operation: "Right eye: The arteries are not contracted and do not show heightened light reflex on either the main branches or the more distant capillaries. The veins are not unduly engorged, tortuous or nicked. No haemorrhages or lymph exudates. Left eye: Similar statement holds for this eye. Would pronounce both fundi as normal. Vision 6/6 partly in each eye. Blood pressure 200/120.

Case No. 10, male, aged 22 years. Blood pressure 164/100. Pre-operative fundus examination: The fundi were normal. Post-operative fundus examination—260 days following operation: "Both eyes—fundi should be declared as normal in every particular." Vision 6/6 in each eye. Blood pressure 115/110.

Case No. 11, male, aged 45 years. Blood pressure 240/126. Pre-operative fundus examination: "Left eye—the arteries are very narrow, but the inferior temporal fairly cuts the dilated vein. There are white patches of exudate, of the cotton-wool variety, around the disc, two on the nasal side, two along the inferior temporal artery, and one just above the superior temporal vein. Many pigment dots at the end of the vessels in the macular area. There is a little swelling of the nasal side of the nerve head, but not enough to measure. Right eye—shows the same picture. The white patches of exudate are smaller but more numerous, there being 8 or 9 just above the macula as well as some on the nasal side. The nerve head is distinctly blurred and swollen. The amount of swelling is chiefly at the nasal side, being about 1 dioptre." Post-operative fundus examination—310 days following operation: "Right eye—somewhat heightened light reflex on the superior temporal artery close to the nerve head where the underlying vein is somewhat engorged and very slightly nicked. A tiny arteriole coming off this branch close to the lamina

cribrosa shows the result of blockage and small flame-shaped haemorrhage. The arteries as a whole are disposed to be contracted. Left eye—the disc is somewhat pale. The arteries, as in the other eye, are contracted, particularly the left superior nasal. The veins are moderately engorged, but not unduly so and are not nicked to any appreciable extent, if at all. A few pigmented changes of the retina, probably the residue of former haemorrhages along the course of the inferior nasal vein. Also some pigmented changes of the same character in the neighbourhood of but not actually in the macular area. Vision 6/6 in each eye." Blood pressure 190/130.

Case No. 12, female, aged 34 years. Blood pressure 170/100. Pre-operative fundus examination: "There is some indistinctness of the nasal margins of both discs. This appears to be within normal limits. The arteries are of smaller calibre than one would expect for a person of this age, and there is an increased light reflex. The veins are nicked where crossed by the arteries, but otherwise the veins are not remarkable." Post-operative fundus examination—330 days following operation: "In both eyes the arteries at times appear to be normal. In other instances there is a definite contracture of the arterial wall with occasional heightened reflex. On the whole I would consider the arteries as being reduced in calibre. There is one small capillary on the temporal side of the right optic disc quite close to the descending branches of the vein and artery which appears as a tiny silver thread or wire and then disappears. The veins are relatively engorged and tortuous but not buckled, at least not to any appreciable degree. There are no haemorrhages and no lymph exudates." Vision 6/6 partly in each eye. Blood pressure 165/120.

Case No. 13, female, aged 43 years. Blood pressure between 240/120 and 120/90. Pre-operative fundus examination: "There are a few peripheral opacities in each lens. Media are otherwise clear. Discs of normal colour and have a sharp outline. The arteries are somewhat attenuated and groove the veins at their crossings. There are no haemorrhages or exudates." Post-operative fundus examination—325 days following operation: "Both discs are normal in calibre and outline. The arteries are slightly thickened and narrower than normal. The veins are slightly buckled where crossed by the arteries. There are no haemorrhages or patches of lymph exudate." Vision 6/6 in each eye. Blood pressure 175/120.

Case No. 14, female, aged 49 years. Blood pressure 198/110. Pre-operative fundus examination: "Both discs of good colour and well defined. The retinal arterioles are narrow but are not tortuous. The veins are engorged and there is arterial nicking. The physiological cups are somewhat indistinct." Post-operative fundus examination—750 days following operation: "I would pronounce these fundi as being absolutely normal in all particulars had I not been put on my guard. Some of the smaller arterial capillaries may possibly be contracted, but such an observation is vague to say the least. The arterial walls are not highly refractile, while the veins are not engorged, tortuous or bent, and there is not the slightest evidence of exudates of any kind in the retinal stroma." Vision in each eye 6/7 partly. Blood pressure 210/125.

Case No. 15, female, aged 29 years. Blood pressure 210/143. Pre-operative fundus examination: "The veins on both sides are enlarged and pulsate. In many places they are compressed almost completely by arteries which cross them." Post-operative fundus examination—1065 days following operation: "Right eye—both the arteries and the veins are disposed to be somewhat tortuous. The veins are definitely notched, note both the superior temporal and the superior nasal vein relatively close to the nerve head. Left eye—shows a relative contracture of the smaller arteries with compensatory dilatation of the veins but without the tortuosity noted in the right eye. There is no buckling in this instance or any other sign of loss of compensation." Vision 6/6 in each eye. Blood pressure 200/150.

PRE-OPERATIVE.

Case No.	Age	Sex	B.P.	Blood Chemistry				Urine			Days P.O.
				N.P.N.	Creat.	Urea	Uric	Sp. Gr.	Alb.	Casts	
1.	36	M	210/140	69·6	1·85	—	—	1010	3+	G & H	698
2.	28	F	228/140	21·7	1·07	—	—	1010	Tr.	O	639
3.	51	F	280/145	20·9	1·03	13·0	—	1005	Tr.	O	440
4.	49	F	260/140	22·2	1·11	—	3·61	1018	Tr.	H rare	330
5.	36	F	260/140	23·6	1·00	—	3·33	1026	O	O	345
6.	43	F	240/128	25·6	1.12	13·6	—	1022	O	O	87
7.	53	M	210/130	—	1·60	20·0	3·70	1028	O	O	455
8.	30	M	172/120	28·8	1·30	—	3·40	1020	Tr.	H & G	505
9.	46	M	204/160	26·5	1·12	—	—	1020	O	O	425
10.	22	M	176/115	19·4	1·17	—	—	1020	O	O	260
11.	45	M	240/126	23·5	1·30	—	—	1018	3+	H rare	310
12.	34	F	220/115	23·5	1·07	—	3·47	1016	O	O	330
13.	43	F	240/120	23·8	—	—	—	1027	O	O	325
14.	49	F	198/110	17·5	—	—	2·21	1031	O	O	750
15.	29	F	210/143	25·3	1·18	—	—	1015	O	H rare	1065

NOTE.—Tr. = trace. G. = granular. H. = hyaline. P.O = post-operative.

POST-OPERATIVE.

B.P.	Blood Chemisty				Urine			Remarks
	N.P.N.	Creat.	Urea	Uric	Sp. Gr.	Alb.	Casts	
210/150	92·4	4 28	—	82·7	1010	O	O	Past month symptoms worse. Fundus and blood chem. worse.
120/80	19·0	1·35	12·9	—	1012	O	H & G	Fundus and symptoms cured.
200/140	27·6	1·50	16·2	—	1022	O	O	Fundus and symptoms improved.
270/110	20·0	1·06	—	—	1012	O	H Rare	Fundus and symptoms improved.
250/145	20·2	1·06	—	—	1022	O	H Rare	Symptoms improved. Fundus slightly improved.
210/130	28·6	1·36	—	—	1022	O	O	Fundus and symptoms improved.
220/135	27·0	1·12	14·7	—	1020	O	H Rare	Symptoms improved. Fundus normal before and after operation.
170/100	25·0	1·06	—	3·50	1020	O	O	Symptoms improved. Fundus normal before and after operation.
200/120	21·6	1·16	—	—	1028	O	O	Symptoms improved. Fundus normal after operation.
155/110	24·5	1·11	—	—	1026	O	O	Symptoms improved. Fundus normal before and after operations.
190/130	50·0	1·50	—	—	1016	2+	H	Symptoms improved. Fundus improved. Blood chem. and urine worse.
165/120	24·8	1·10	—	—	1030	O	O	Symptoms and fundus improved.
175/120	20·2	1·03	—	—	1028	O	O	Symptoms and fundus improved.
210/125	20·0	1·00	—	—	1020	O	O	Symptoms and fundus improved.
200/150	25·0	1·06	—	—	1016	O	O	Symptoms improved. Fundus: arteries contracted, unchanged after operation.

NOTE.—Tr. = trace. G. = granular. H. = hyaline. P.O. = post-operative.

Discussion

With the exception of case 1, which continued to follow a malignant course and in which the fundus findings became more involved following operation, improvement, or at least an arrested development in complications involving the fundus oculi, appeared to be the case in our series. From every standpoint, including that of the fundus oculi, 2 were cured, 3 were markedly improved, 8 moderately improved, and 1 unchanged. The fundus oculi frequently appeared to be a barometer of the general well-being of the patient. The changes, as they were recorded for the better, simply reflected the general lowering of the blood pressure and the improvement in the blood chemistry and urine findings. Of all these changes the improvement in the fundus findings and visual acuity were possibly the most dramatic. It should be observed, as we have already pointed out.,[1] that an absence of retinal lesions was noted in 28·6 per cent. in a relatively large series of cases of essential cardiovascular hypertension. In the present series, relatively and of necessity much fewer in number, an absence of fundus changes was noted both before and after operation in 37 per cent., which, if allowing for the statistical error inherent in small numbers, would not be out of keeping with our previous figures. One cannot overlook the much larger series of cases of a similar character reported by Fralick and Peet[2] where a comparable surgical procedure was undertaken. After reviewing their series, our percentage of cases, where an improvement in the fundus oculi was observed, might be recorded as most encouraging.

The question will quite logically be raised; in how far were these cases malignant in character, and what would have been the patient's expectancy of life had operative interference not been undertaken? The clinician's reply is, that had interference not been undertaken death would have ensued within days or weeks at the latest. Indeed, one patient (Case 11) was operated upon only on the strongest possible insistence of the clinician and following the greatest discouragement on the part of the neuro-surgeon. According to Keith, Wagener and Kernohan,[3] in their 81 cases with malignant hypertension, the average length of life after diagnosis was eight months. Two patients operated upon, not recorded in this series, died before this review was taken under consideration. Although the ophthalmoscopic findings in these patients at the time of operation were in our possession, the subsequent ophthalmoscopic and clinical findings could not be placed on record, as has been done in the case of those who survived. Hence, these cases have not been included in this series.

The operation used in the present series of cases has been fully described elsewhere by Penfield and Cone.[1] A section of the 11th rib near the spine is removed and the sympathetic chain exposed.

The 9th, 10th, 11th, and 12th thoracic ganglia are removed and also sections in the greater, lesser and least splanchnic nerves. This operation is closely comparable to that of Peet and his co-workers. In our series of cases no other type of operation was used, such as that of anterior root section (Allen and Adson[5]) and infradiaphragmatic sympathectomy (Craig and Brown[6]). In all types of operation the physiological result seems to be about the same. As illustrated in this series, an initial fall of blood pressure usually occurs, followed by a rise approaching the pre-operative level. In only a few is the blood pressure maintained at a lower level. The present results are in agreement with those of Allen and Adson, Freyburg and Peet,[7] Page and Heuer.[8]

Considerable light has been thrown upon the effect of these operations by the experiments of Goldblatt, Lynch, Hanzal, and Summerville,[9] who brought about hypertension in dogs by the production of renal ischaemia. Their work was confirmed by Wood and Cash.[10] It is interesting to note that Grimson, Wilson and Phemister[11] found the same variable results in the blood pressure after splanchnic sympathectomy in normal dogs. Also Goldblatt, Gross and Hanzal[12] obtained these results after sympathectomy in dogs suffering from experimental hypertension. This return to the level of the pre-operative blood pressure is not surprising when one takes into consideration the physiological factors entering into the production of hypertension. These factors are understood poorly as yet. On the other hand, the histological vascular changes in hypertension are well understood. Hypertension has been shown by numerous experimenters to be due to contraction of the small arteries and arterioles, thus impeding the blood flow. As Ricker[13] has pointed out, perivascular pathological changes take place when the capillaries dilate, owing to fatigue, while the arteriolar contraction is maintained. When this occurs diapedesis and exudation take place. These facts are well accepted, but there is much controversy over the point as to what produces the vasospasm. Normal vascular tone is partly due to nervous influences. Thus after denervation there is vasodilatation and a drop of blood pressure. But after such a procedure vasodilatation is not complete. Hence, one must postulate the presence of some chemical substances which help to maintain vascular tone. Some such substances are well known, namely, adrenine, and the pressor substance from the anterior lobe of the pituitary. The experiment of Goldblatt, Lynch, Hanzal and Summerville mentioned above, indicates that possibly some pressor substance is liberated from the kidney under conditions of ischaemia. Hypertension, then, in the first instance may be caused by a preponderance of any of these factors. There are those who argue in favour of a nervous origin and those who argue in favour of a chemical origin. It is possible,

if not probable, that all play a part; the chemical balancing or compensating for any deficiency in the nervous factor under normal conditions. Later, of course, pathological changes take place in the artery walls which maintain the obstruction to the blood flow. Splanchnectomy produces its effect possibly by several methods, denervation of the splanchnic vessels, the adrenals, and the relief of renal ischaemia. But these results are only temporary. Some compensating mechanism comes into action. The result is that the patient's blood pressure rises to the pre-operative level; but with this difference that there are less perivascular changes as seen in the fundus oculi and the patient is symptomatically improved. This probably can be accounted for by the presence of a large denervated vascular area which acts as a safety valve, thus relieving the patient of sudden changes in the blood pressure. Denervation of the adrenals probably contributes in this effect. Such action is important, as it is probable that sudden changes in blood pressure are what cause the damage to vital organs. It is during such occasions that diapedesis and perivascular exudation are most likely to take place.

Thus, in conclusion, it may be stated that, by and large, this operation is disappointing in its effect on the blood pressure level, but, nevertheless, the patients are improved, when one takes into consideration symptoms and fundus findings. Until we know more about the causation of hypertension this is justification enough for such a radical procedure to be undertaken in selected cases. Certain it is that patients suffering from malignant hypertension follow a steady downhill course and deterioration of vision occurs in the absence of such interference. This operation must not be considered as a factor which eliminates the cause of cardiovascular hypertension, but rather as one which arrests its complicating features.

We would beg to acknowledge with gratitude the constructive assistance afforded us by Dr. Wilder Penfield and Dr. William Cone, of the staff of the Montreal Neurological Institute, in allowing us access to their records, as well as for much valuable practical assistance. We are also under a debt of gratitude to Dr. J. F. McIntosh, Research Fellow in the Department of Medicine, for his contribution in supplying us with the complete blood chemistry of all the cases which we have placed on record.

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THE TABETIC PUPIL

BY

PERCIVAL W. LEATHART, M.B., B.C.(Cantab.)

SENIOR SURGEON, LIVERPOOL EYE AND EAR INFIRMARY, AND MEMBER OF ITS OTO-LARYNGOLOGICAL CLINIC

THE normal movements of the iris are brought about by reflex stimulation of the three intrinsic ocular muscles.

1. The dilator iridis.
2. The constrictor iridis.
3. The ciliary muscle.

Associated with the action of each muscle is a primary nervous reflex.

1. The dilator reflex.
2. The constrictor reflex.
3. The accommodation reflex.

In order to appreciate the significance of abnormalities in the movements and size of the pupil in disease, it is essential to have a clear idea of the anatomy of the various pathways on both the afferent and efferent sides.

The dilator reflex—mediated by sympathetic fibres.—Although experimental proof is lacking, it is generally conceded that the afferent fibres of the dilator reflex leave the retina in company with the visual fibres in the optic nerve.

After a partial decussation in the chiasma they reach the optic tract, and enter the midbrain through the brachium of the superior colliculus. In this region they gain access to some extra-pyramidal tract, possibly the tectospinal, and in it pass through the midbrain, pons, medulla and cervical spinal cord to reach cells in the lateral horns of C_8 - D_3—the so-called cilio-spinal centre.

In this region of the spinal cord there is said to be a decussation of the afferent dilator fibres which renders the consensual reaction possible.

Here the afferent pathway ends and the efferent begins. The efferent fibres, taking origin from the cells in the lateral horns of C_8 - D_3, leave the spinal cord as preganglionic fibres via the anterior roots and anterior primary divisions of these segments and enter the cervical sympathetic chain by the white rami connecting it to these segments, and pass up the cervical sympathetic to the superior cervical ganglion where a final relay takes place. The efferent pathway is continued by post-ganglionic fibres through the carotid and cavernous plexuses to the ophthalmic artery and pass with it through the optic foramen. In the orbit they come into contact with but do not relay in the ciliary ganglion and pass into the bulbous oculi with the short ciliary nerves to reach the dilator iridis.

The stimulus which activates the dilator reflex is a decrease in the intensity of light. A lesion in the afferent or efferent limb of this reflex will paralyse the dilator muscle and thus allow the unopposed constrictor to contract the pupil. Such a pupil is seen after cervical sympathectomy, where the homolateral pupil is smaller than its fellow and contracts still more to light.

The constrictor reflex—mediated by parasympathetic fibres.—The afferent fibres leave the retina in the optic nerve and have been traced through it and the optic tract. After reaching the lateral aspect of the midbrain the fibres leave the optic tract and enter the midbrain through the brachium of the superior colliculus. They do not, however, enter this structure but gain access to cells in the pretectal region where the first relay takes place. From these cells fresh fibres arise which pass to the Edinger-Westphall nucleus of both sides—the para-sympathetic nuclei of the third nerve nucleus.

This anatomical detail explains the consensual light reflex. Here the afferent limb ends and the efferent begins in cells analogous to those in the lateral horns of C_8 - D_3. The efferent fibres enter the orbit in the trunk of the third nerve and, after a short journey

in the inferior division, leave the nerve to the inferior oblique muscle as the short root of the ciliary ganglion. After a final relay in this ganglion they leave it in the short ciliary nerves, enter the bulbous oculi and end in the constrictor iridis.

The stimulus which activates the constrictor reflex is an increase in the intensity of light. A lesion of its afferent or efferent limb or of its centre (Edinger-Westphall nucleus) in the mid-brain, causes paralysis of the constrictor iridis and therefore a dilated pupil. In addition since such a lesion destroys the light reflex contraction to light cannot be obtained.

The accommodation—constrictor reflex. — When an object is brought close to the eyes three separate reactions take place simultaneously.

1. The eyes converge,
2. The ciliary muscle contracts,
3. The pupils constrict.

The object of these phenomena is to shut off peripheral rays, and to increase the curvature of the lens, so that an image which would otherwise be blurred or seen double is perceived clearly as a single image.

By means of suitable lenses (prisms) it is possible to prevent convergence without interfering with accommodation or constriction. Moreover cases are seen from time to time suffering from the ocular type of progressive muscular atrophy in which, in spite of paralysis of both internal recti, rendering convergence impossible, yet near vision is accompanied by accommodation and pupillary constriction. It is clear therefore that accommodation and pupillary constriction can take place in the absence of convergence and that in such cases the stimulus for this reaction is a blurred image seen in the occipital striate cortex.

Conversely, in certain cases of blindness, voluntary convergence produces pupillary constriction. Since, in this case, the object is not seen, a blurred image cannot be the stimulus. Clearly afferent proprioceptive impulses caused by contraction of the two internal recti are effective in producing pupillary constriction.

The accommodation-constriction reflex is therefore produced by two different stimuli:

1. A blurred image,
2. Proprioceptive impulses arising from the contraction of the two internal recti.

Normally the two stimuli act in conjunction with one another but should one be in abeyance the other can produce the desired result.

The afferent portion of the blurred image reflex is complex and has not been thoroughly worked out, so that the following suggested pathway is necessarily tentative.

Starting from the retina it passes along the visual fibres of the optic nerve and tract to the lateral geniculate body and from here

to the striate cortex by the optic radiations where the blurred image is perceived. This initiates an impulse to area 19 (Brodmann), stimulation of which causes constriction of the pupil. From here fibres pass in some cortical association pathway and reach the internal capsule down which they pass to gain that portion of the motor oculi nucleus in the mid-brain known as the nucleus of Perlia. This nucleus like that of Edinger-Westphall is parasympathetic in function. From cells in the nucleus of Perlia the efferent pathway reaches the ciliary muscle and the constrictor iridis by parasympathetic fibres. These fibres unlike those of the efferent constrictor reflex from Edinger-Westphall's nucleus do not pass through the ciliary ganglion. This fact is proved by the experiments of Foester Gagel and Mahoney, who find that ablation of the ciliary ganglion abolishes the light reflex but not the pupillary constriction to convergence. It follows therefore that the final common pathway for the accommodation-constrictor reflex is discrete from that of the constrictor reflex. The details of this pathway have not yet been worked out.

The afferent limb of the convergence reflex passes from the two internal recti through the trunk of the motor-oculi nerve to the nucleus of Perlia.

The efferent limb, or final common path, is common to it and that of the blurred image, and discrete from that of the efferent constrictor reflex pathway.

In addition to the reflexes already described there are others activated by emotion, *e.g.*, anger, fear, pain etc., which arise at higher physiological levels than the mid-brain, *viz.* cortical, thalamic and hypothalamic. The pathways by which contact is made between these on the one hand and the dilator constrictor and accommodation reflexes on the other have not been carefully worked out.

Since intracranial lesions affecting these reflexes above the mid-brain do not permanently interfere with the reflex movements of the iris no further mention of them will be made in the discussion which follows.

The tabetic pupil.—In neuro-syphilis abnormal movements of the iris are frequently seen, especially in tabes dorsalis. The typical pupil found in this disease was first described by Argyll Robertson and has been known by his name ever since. Such a pupil has the following characteristics:

1. It is small.
2. It does not dilate in the dark.
3. It does not contract in the light.
4. It contracts normally to convergence and accommodation.

Argyll Robertson did not explain how a pupil with the above characteristics was produced, and although since his day many

attempts have been made to explain it, none so far has been completely convincing. Moreover the Argyll Robertson pupil has not yet been produced experimentally. (Fulton 1938.)

On the assumption that the description of the anatomy of the primary ocular reflexes given above is in the main correct, it is possible, in fact easy, to postulate a lesion which will cause a pupil with all the characteristics of the tabetic pupil. This hypothetical lesion must damage the dilator reflex in order to cause a small pupil which does not dilate in the dark. It must also paralyse the constrictor reflex to produce a pupil which will not contract to light. In addition it must leave the accommodation convergence reflex uninjured.

Let us place this lesion in the brachium of the superior colliculus. In this position the afferent fibres of both the constrictor and dilator reflexes are in close proximity and would inevitably be damaged. The afferent fibres of the accommodation reflex, however, have previously left the optic tract to enter the lateral geniculate body and are therefore left intact.

A lesion in the brachium of the superior colliculus therefore will produce a small pupil which will not dilate in the dark or contract in the light, but will react to accommodation and convergence. In short a pupil with all the attributes of the Argyll Robertson pupil. This hypothetical lesion must of course damage the brachia of both sides. There is both pathological and neurological evidence in favour of this contention.

Pathological Evidence

We know that the syphilitic poison has a predilection for afferent sensory fibres and that in neuro-syphilis their destruction in the posterior roots is responsible for the loss of both knee and ankle reflexes.

The reason why the syphilitic poison selects afferent fibres in this situation is not clear. We should remember, however, that the fibres in question are small myelinated fibres, and in their passage from the posterior root ganglion to the cord are bathed in the cerebro-spinal fluid in the arachnoid space. In neuro-syphilis this fluid always contains the syphilitic poison and it may well be that the small myelinated fibres of the posterior roots are more vulnerable to the poison in this situation than the large myelinated fibres of the anterior roots.

The position with regard to the afferent fibres of the ocular reflexes as they enter the mid-brain is exactly similar. Those in the brachium of the superior colliculus subserving the dilator and constrictor reflexes are small myelinated fibres, those entering the lateral geniculate body activating the accommodation-convergence reflex being the visual fibres themselves are large myelinated fibres —both sets of fibres are surrounded by infected cerebro-spinal fluid —the former are destroyed, the latter remain uninjured.

The above evidence is enhanced by the fact that it brings the pathology of the tabetic pupil in line with that of the loss of knee and ankle reflexes so commonly seen in tabes.

Neurological Evidence

In order to produce tabetic pupils by means of a mid-brain lesion we must postulate one which injures both Edinger-Westphall nuclei in order to paralyse the constrictor reflexes. It must also damage both sympathetic tracts after they have left the brachia of the superior colliculi in order to produce small pupils. In addition this lesion must not only leave the nucleus of Perlia intact so that constriction on accommodation can be obtained but also avoid all the other nuclei and tracts of this crowded region.

It is true that a pupil inactive to light but active to accommodation is sometimes seen in mid-brain tumours and in the ocular type of progressive muscular atrophy. In these conditions, however, this pupil is almost invariably unilateral at first, usually large, and accompanied by other physical signs not present in tabes. Neurologically it is well nigh impossible to conceive of a mid-brain lesion capable of producing tabetic pupils without causing additional physical signs not present in tabes.

It is extremely improbable, therefore, that a mid-brain lesion is responsible for the tabetic pupil; the balance of evidence is strongly in favour of a peripheral origin, the site of which is the brachia of the superior colliculi.

Summary

1. The anatomy of the three primary ocular reflexes is described in detail.

2. The characteristics of the tabetic pupil are enumerated.

3. It is shown how it is almost impossible for a mid-brain lesion to produce pupils with the characteristics of a tabetic pupil without at the same time causing other physical signs.

4. It is pointed out that a hypothetical lesion in the brachium of the superior colliculus of both sides produces pupils with all the characteristics of the tabetic pupil.

5. It is postulated that such lesions are present in tabetics and are the cause of the Argyll Robertson pupil.

6. A possible explanation of the fact that syphilitic poison destroys afferent fibres of posterior spinal roots and of the brachia of the superior colliculi is given.

7. It is postulated that such lesions are present in tabes in the posterior roots and in the brachia of the superior colliculi and are the cause of absent knee and ankle reflexes and of the Argyll Robertson pupils respectively.

THE EXPERIMENTAL RADIOGRAPHY OF SMALL FRAGMENTS OF GLASS IN RELATION TO THE HUMAN EYE

BY

R. U. GILLAN

WALSALL AND WEST BROMWICH

THE object of this experiment was to discover whether or not, small fragments of various kinds of glass were opaque to X-rays in conditions approximating to those which would obtain supposing such a fragment to be in the eye or orbit, and to be the subject of radiography.

The subject appeared to me to be of some importance, in view of the widespread use of glass, its vulnerability, and the frequent circumstances in which particles of it may enter the eye, especially in modern war-time conditions. The prevailing opinion appears to be that, whilst lead glass is certainly opaque, it is doubtful whether other kinds are. Thus, Parsons (1934) states that particles of glass commonly fail to reveal their presence in the skiagram, except heavy lead glass, and in a text book edited by Shanks, Kerley and Twining (1939), it is stated that chips of glass may cast a shadow, but that spicules of lead glass certainly will. Baker (1937) refers to the difficulties of radiography when the foreign body is some comparatively radio-translucent substance, such as glass or wood.

The matter was brought to a head by my having a case of retained foreign body of the eye, suspected of being glass from the history, but suspected of not being glass by an ophthalmologist of very great experience, on account of its being opaque to X-rays. Doubts were also expressed on the subject by an ophthalmic radiographer, with very many years of experience in the interpretation of X-ray plates. He did, however, incline to the view that the opacity was caused by glass. Subsequent experience proved the foreign body to be indeed glass, the fragment being removed from the eye at operation.

The mode of conducting the experiment was as follows. Various specimens of glass, 14 in number, were selected. A piece of each was taken in turn, covered by two layers of gauze, placed on a piece of cardboard, on a table, and hit smartly with a wooden mallet. The result was fragmentation, and of the fragments were selected three, measuring as nearly as possible in thickness, 2 mm., 1 mm., and ½ mm. respectively, measurements being made by calipers having a large degree of accuracy, and measuring to within 1/10 mm. These were now taken and fixed at equidistant intervals on a small square of dental wax. The piece of wax was then fixed

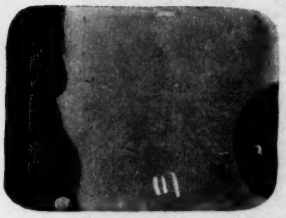
in position over the front of the closed eyelids by means of a bandage, in such a way that the three fragments were opposite the orbital opening. The subject's head was placed facing downwards over a casette, and an exposure of 2 seconds was made with the X-ray tube above the occiput, at a distance of 20 ins. from the film, and using a kilo-voltage of 55. This exposure therefore was made through the whole diameter of the skull. The piece of wax was then placed sagitally, in such a way that the three fragments of glass were in close apposition to the inner aspect of the eye, the eyelids being open. A dental film was placed in a similar position on the nasal side, and an exposure made with the X-ray tube on the temporal side of the skull, at a distance of 14 ins., and in such a way as to obtain a bone-free picture of the eye. In this exposure a kilo-voltage of 50 was used. I wish to express my thanks to Sister Burrows, of the X-ray Dept. of the West Bromwich and District Hospital for her co-operation in the conduct of the experiment.

The purpose of the two exposures, was in the first, to demonstrate the effect in the case of the rays passing through the thickness of the skull and the eye and eyelids, and in the second, of their passage through the soft tissues of the eye and eyelids only.

It is admitted that in the case of the second exposure, the X-ray film is much closer to the fragments of glass than would obtain in an actual case of retained foreign body. The same objection does not, however, hold good in the case of the first exposure, where the distance of the fragments from the film is much greater and approximates more to the conditions which would obtain in an actual case. The distance was about 2 ins. It seemed to me that the conditions of the experiment were as near reality as possible in a human subject.

The list of glasses chosen include those most commonly in use, namely various window glasses, spectacle glass, glass used in motor car windscreens, and bottle glass. They are tabulated below.

Group A	1	24 oz clear.	Specimens of domestic and shop window glass kindly supplied by a local firm.
	2	¼-in. polish plate.	
	3	⅛-in. rough roll.	
Group B	4	Crown spectacle glass.	Specimens of spectacle glass kindly supplied by Messrs. C. Davis Keeler, through Mr. Saward.
	5	Crookes glass A.2.	
	6	London smoke glass.	
	7	Salvoc safety glass.	
	8	Welders blue.	
Group C	9	Toughened safety glass (Triplex).	Specimens of motor windscreen glass kindly supplied by Messrs. Triplex, and Messrs. Pilkington of Birmingham.
	10	Laminated safety glass (Triplex).	
	11	Armour Plate glass (Pilkington).	
Group D	12	Green bottle glass.	Specimens of bottle glass picked at random.
	13	Brown bottle glass.	
	14	White bottle glass.	



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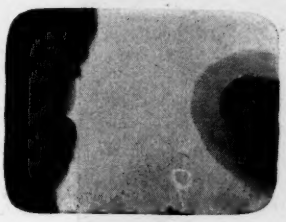

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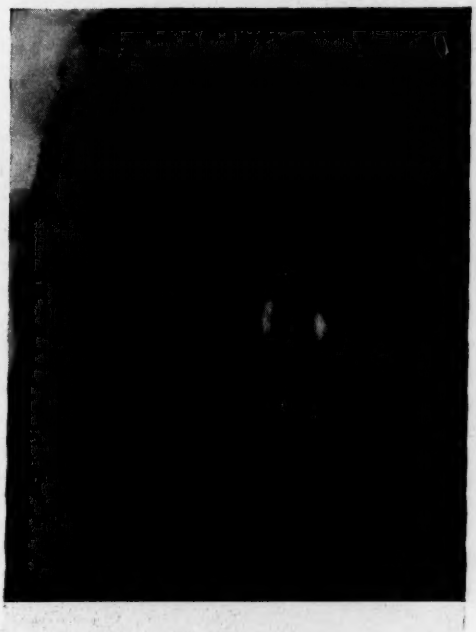

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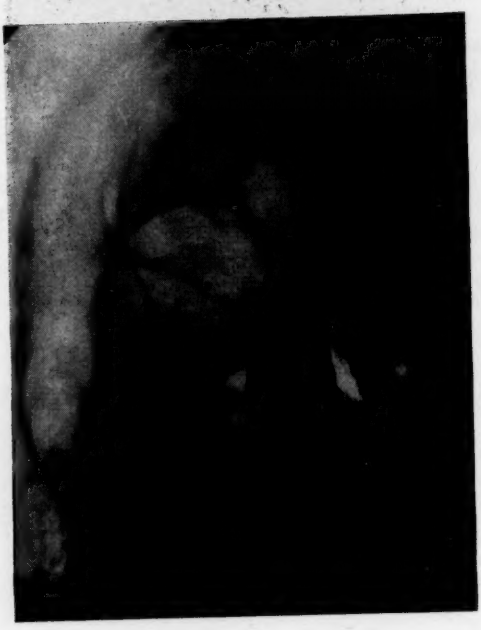

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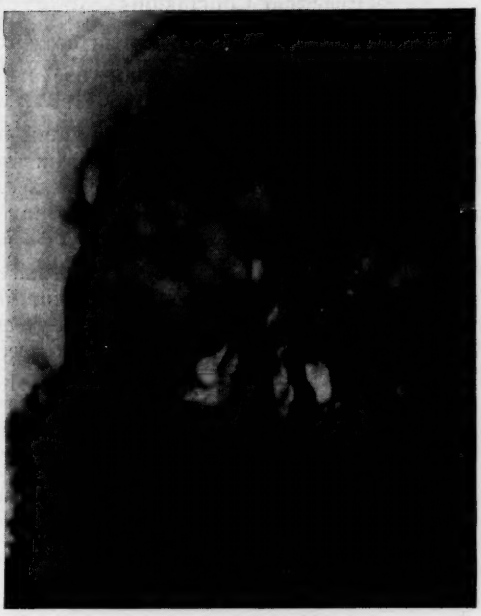

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The result of the experiment was the discovery that all pieces of glass of whichever thickness used showed up on X-ray, both on antero-posterior and on lateral bone-free exposure, the 2 mm. pieces showing the most clearly and the ½ mm. the least clearly, as one would expect. Some of the ½ mm. fragments were somewhat difficult of detection in the antero-posterior exposures, but a comparison of the exposed film with the corresponding specimen mounted on dental wax showed that a shadow could be detected in all cases, corresponding in position with the ½ mm. fragments. Specimens of 1 mm. and 2 mm. thickness were easily detected. Specimen No. 5 (Crookes A.2) threw the densest shadow. Other specimens showed a lesser density of shadow, and no great variation in respect of this, existed among them.

One radiograph from each group is reproduced as a matter of interest, and to give some idea of the density of shadow produced. These are:

Group A	No. 1	(24 oz. clear domestic window glass.)
„ B	No. 8	(Welders Blue.)
„ C	No. 9	(Toughened Safety Glass.)
„ D	No. 12	(Green Bottle Glass.)

Practical Conclusions

Conclusions emerging from this experiment are as follows.

(1) That most kinds of glass in common use are opaque to X-rays.

(2) That small fragments of the order of ½-2 mm. in thickness show an opacity when exposed through the thickness of the eye and eyelids, and in addition through the thickness of the skull, but that fragments of under 1 mm. in thickness may be difficult of detection in such conditions.

(3) It may be concluded that pieces of glass actually in the eye or orbit and exposed to X-rays under comparable conditions would also show, but that having regard to the somewhat greater distance of the foreign particles from the film in such a case, fragments of under 1 mm. in thickness would *a fortiori,* be difficult of detection.

Summary

The object of the experiment is stated and the reasons given which led to its inception.

The details and mode of conduct are described.

The limitations of the experiment are discussed.

A classified list of the glasses used in the experiment is given.

The results of the experiment are given, and the practical conclusions are drawn, which appear to emerge therefrom.

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A SIMPLE OPTICAL APPLIANCE FOR USE WITH RESPIRATORS

BY

P. KINMONT, M.D., F.R.C.S.Ed., A.D.M.S., E.M.S.

NEWARK-ON-TRENT

THERE must be many hypermetropic presbyopes like myself, who have sought in vain for spectacles to wear inside the general service and civilian duty respirators which permit clear vision for reading and writing messages etc.

I have tried many makes of flat-sided spectacles for wearing inside the respirators, only to find that:—

(*a*) The pressure on the bridge of the nose is painful.

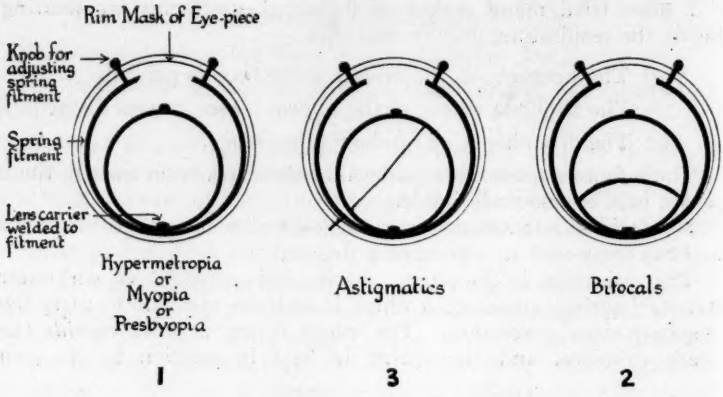
(*b*) The slightest tilting of the bifocal lenses causes distortion.

(*c*) The dimming is an intolerable nuisance.

These factors necessitate removal of the mask from time to time, which is of course undesirable.

My optician has adopted my suggestion to remedy these faults and has succeeded to a gratifying degree.

The principle is simplicity itself, and consists of an outer flat steel spring, attached to which is an inner eye-wire to carry the requisite visual correction. The whole fitting is worn *outside* the mask eyepiece, and the spring is kept in position by its own



elasticity, which allows for accurate adjustment of bifocal lenses or cylinders. In the latter case a mark may be made on the metal surround of the eyepiece, and a corresponding mark on the lens to ensure rapid and accurate adjustment.

The two projections enable the appliance to be contracted and planted into the recess of the mask eyepiece, and also enable the wearer easily to rotate the whole into the best position for clear vision.

The fitting is equally suitable for hyperopes, myopes, and astigmatics, also for presbyopes who use bifocal lenses and is designed to permit centreing of the lenses. It should prove useful to the men of our fighting forces and members of the A.R.P. Services.

It is to be noted that owing to the width of the nose-piece of the mask, near vision may be monocular, but in reading and writing, I find this presents no difficulty. Distant vision is binocular.

A spare mask eyepiece makes an admirable carrier for the fitment and of course a replacement in case of a splintered eyepiece.

I express my thanks to my optician, Mr. A. McNicol of Newark-on-Trent, for his patience and skill in producing the appliance which has proved a god-send to me and I trust will be of help to many others.

WAR-TIME STREET LIGHTING AND AIDS TO MOVEMENT IN STREET*

Summary of the Report on Fundamental Requirements, underlying the War-time Street Lighting prepared for the Joint Committee of the Ministry of Home Security and the Illuminating Engineering Society. The Report will appear in full in the Society's "Transactions."

The human eye can adjust itself to wide variations in degrees of brightness. The illumination received from summer sunlight may attain 10,000 ft.c., faint starlight may be of the order of 1/10,000 ft.c.—a range of about one hundred millions to one.

This study is devoted to vision at the lowest levels in this range of illumination which is all that is available out of doors on a clear moonless night and is of the same order as that furnished by war-time street lighting (0·0002 ft.c.).

Behaviour of the Eye in Weak Light

The conditions characteristic of "twilight" vision are broadly as follows:—

(1) Complete dark-adaptation is only slowly attained by an eye previously adapted to normal illuminations. A person emerging from a brightly lighted room into a dark street requires some minutes before the eye can "take in" its surroundings. Thirty minutes is a reasonable time to allow for full adaptation. Such adaptation can be quickly destroyed. Momentary exposure of the eye to bright light will partly undo the results of a long period of waiting. Persons differ much in their speed of adaptation. Some, *e.g.*, elderly people, approach the condition of "night blindness" and have great difficulty in finding their way in semi-darkness.

(2) At normal illuminations vision is most acute near the centre of the retina, which is normally exercised in the recognition of form. With twilight vision this area is relatively insensitive. Two consequences follow:—

(i) Objects are no longer perceived by direct vision, but "out of the tail of the eye."

(ii) The outlines of objects are never seen with the same clarity as by normal vision; they tend to appear as masses, limits of which are less clearly defined.

(3) At the low order of illumination characteristic of twilight vision, colours can no longer be distinguished.

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* Reprinted from "Light and Lighting," December, 1940, with permission of Mr. J. S. Dow, Secretary of the Illuminating Engineer Society.

Visual Sensitivity at Low Levels of Examination

STATE OF ADAPTATION

The provision of even a weak degree of general illumination shortens the period of adaptation and fixes the order of brightness to which the eye must adjust itself, having thus a certain stabilising influence. When exposed to a certain illumination—even if only of a low order—the hyper-sensitiveness of the eye characteristic of complete dark adaptation is less marked and the effect of exposure to an object of moderate brightness less severe. Therefore, the first essential is to abstain from any action liable to impair sensitiveness of the retina. Not merely should extreme conditions of dazzle, creating momentary semi-blindness, be avoided; one should also avoid any condition of excessive contrast such as may depress the action of the eye and prevent it getting the full value of the weak illumination available.

LIMITS TO BRIGHTNESS

At very low illuminations new standards are necessary. At normal illuminations, say, about 5 ft.c., there are recommendations that within the direct range of vision (*a*) the brightness of no object should exceed 5 candles per square inch, and that (*b*) the variation in brightness of objects within this range should not exceed 100 : 1.

Application of the rule quoted above to conditions met with in areas receiving an illumination of 0·002 ft.c. would give a limiting brightness of 0·002 candles per square inch, roughly equivalent to 0·1 equivalent foot-candles. Adoption of the 100 to 1 ratio, on the other hand, would give a brightness of about one-fifth of this, namely 0·02 e.f.c.

SIZE OF OBJECT

At these weak illuminations seeing is effected by the peripheral region of the retina, where perception of form is less acute. Only the broad shapes of things at close quarters can be seen. The image of an object subtending at the eye an angle less than 2 to 3 degrees is liable to fall inside the central region of the retina when it becomes invisible. Objects of this size cannot be seen with certainty. They " appear and disappear " as one is looking at them. Moreover, impressions may depend upon the product of area and brightness. Larger objects appear brighter than small ones, which again enhances their visibility.

IMPORTANCE OF CONTRAST

Another factor of vital importance is the ratio of brightness between object and its background. At high illuminations, under

very favourable conditions, a difference in brightness of only one to two per cent. can be detected. At very weak illuminations a difference of 20 or even 30 per cent. can scarcely be detected with certainty. An object of quite substantial size which reflects only 20 per cent. less or more than the adjacent roadway and receives an illumination of only 0·0002 ft.c. might easily escape recognition.

In order to ensure that an object may be visible it is therefore expedient (i) to ensure, if possible, that the angle subtended at the eye is well outside 3 degrees; (ii) to secure a relatively high contrast with its background, and at the same time (iii) to guard against the possibility of depressing vision by *excessive contrast*, so great as to approach glare conditions.

COLOUR

It is evident that it is of no use, at a very low order of brightness, to rely on colour as a means of distinction, since colour as such can no longer be distinguished. Moreover, a red object, such as a pillar box, becomes indistinguishable from a dark background. Objects desired to stand out from their dark surroundings at low illuminations, and which are identified by their colour under normal conditions, should preferably be painted green or blue. The sensitiveness of the eye to blue light is accentuated at very low illuminations. Yet the use of such light in preference to white light is not advantageous. The general use of pure blue light involves considerable absorption, and is therefore uneconomical, and for some purposes it is considered inexpedient owing to certain loss in sharpness of outline of objects illuminated when viewed from some little distance away.

Applications

The utility of an illumination of the order of 0·0002 ft.c. depends entirely on the avoidance of factors liable to depress visual sensitivity. It is desirable to do everything possible to facilitate the transition from the brightness indoors to the relative obscurity outside. Light traps, besides their primary object of preventing escape of light from within, have a secondary field of utility—in providing a period of adaptation. If behind an entrance there were a short passage or ante-room where the illumination was graduated by steps from the full illumination inside (say, 3-5 ft.c.) down to, say, 0·02 ft.c. at the threshold where, if possible, one should linger for a short time the final transition down to 1/10,000th or less of the original illumination would be rendered easier and the period of subsequent adaptation shortened. In any case, a wait of a few minutes is desirable before movement is made.

The next step is to avoid the presence of objects of undue brightness out of doors. Headlights and traffic control signals, the power

of which is necessarily fixed at a value far exceeding that necessary for the recognition of objects at short range, inevitably give rise to some degree of glare. In both cases, however, control of the beam and the adoption of screens and masks does much to mitigate the trouble. It is chiefly when regulations are disregarded that serious glare is liable to arise.

OBJECTS OF " UNDUE BRIGHTNESS "

For all classes of users, however, the presence of unduly bright objects in the field of view is a drawback. Indications of limiting brightness have been quoted. At this low level of illumination higher values might perhaps be permitted. It is, however, interesting to observe that the first of these values (0·1 e.f.c.) is the maximum assigned to illuminated A.R.P. signs (BS/ARP 32) as a result of long and continued and careful experimental investigation, whilst the second is exactly that specified in the Lighting Restriction Order as the limiting brightness of illuminated display signs. Hence there seems good ground for the adoption of a value of brightness of the order of *0·05 to 0·1 e.f.c.* as a limit in streets —especially as these limits have been independently determined with a view to restricting conspicuousness from the air.

It may be useful to apply this yardstick to luminous objects commonly met with in streets. Reference has been made above to motor car *headlights* and *luminous traffic signals*. The position in regard to *rearlights* and *side lights* is possibly different. Their effectiveness is properly defined in terms of *brightness* limited by the use of suitable diffusing media. Other devices, such as the use of a concealed light under the body of the car showing its breadth by silhouette or the application of indirect lighting to the back surfaces of cars, might well be explored and the liability to glare diminished.

Lights indicating the positions of *refuges and obstructions* frequently offend by their glare, making it difficult to distinguish outlines of adjacent objects. The Restrictions on Lighting Order No. 74, 1940, specifies a brightness for the "cross" of 0·5 candles per sq. ft. (roughly 1·5 e.f.c.), which is 15 times the extreme limit proposed above. (Experience suggests that this value is often greatly exceeded.) The same applies to red lights indicating obstructions. The limitation to 1 c.p. (probably also little observed in practice) is not accompanied by any restriction in brightness, and the presence of such lights may actually impede observation of the limits of the obstruction. From a visual standpoint requirements would be better met by ensuring that objects are provided with a low illumination enabling them to be recognisable, and that the brightness of any signal light, intended to give warning at a distance, does not exceed the limits specified above.

The *torches* commonly used by pedestrians have likewise great drawbacks. The concentrated beam they provide produces an illumination at once uneven and in excess of that needful. They would be more serviceable if constructed in a box form with no lens but a light-giving area of several square inches giving diffused light of low brightness but even quality, and equipped with a hood in order to render the emission of light above the horizontal improbable.

APPLICATION OF THEORY TO SIZE AND CONTRAST OF OBJECTS IN STREETS

At weak illuminations a degree of contrast much beyond that ordinarily sufficient may be necessary in order to enable even objects of substantial size to be seen. The images of objects subtending less than about 3° at the eye are liable to be received on the insensitive area and escape notice. Now 3° represents about 2½ ft. at a distance of 60 ft. It is, therefore, expedient that obstructions should be illuminated over an area having at least this linear dimension. It is also desirable to increase the available *brightness* whenever it is expedient to do so. By selecting *materials of high reflecting power* we may sometimes achieve results as good as if ten times the illumination on a relatively dark material were provided.

The area of darkest tone commonly met with in the street is the road surface. A city pavement, in general, comes conveniently about mid-way between this and white paint, and therefore affords a moderately good background both for the figures of persons in dark clothing and for obstacles treated with this material. White paint used with discretion at *busy crossings* and on *vertical surfaces* such as walls and railings, etc., enables persons crossing the roadway to be more easily seen.

The extensive whitening of the kerb both on the horizontal, and for drivers of vehicles and persons on the other side of the road, the value of the whitening of the *vertical surfaces of kerbs* has proved itself. The application of white paint to motor vehicles is also useful, but should be applied to a much greater area than is at present usual.

Contrasts in brightness play an important part in creating a sense of perspective and enabling people to "size up" their position. This is illustrated by the admitted value under conditions of war-time street lighting of the circular white rings on tree trunks. There seems every reason to exploit to the full the revealing value of white surfaces placed at corners, and similar devices which show up in a headlight beam. Wider use might also be made of *directive reflecting surfaces*, as commonly used for warning signs, etc.

On the other hand, *isolated bright spots of light,* such as the luminous crosses on islands (and, in some cases, the rear lights of motor vehicles), may, unless carefully controlled, destroy perpective and may render it most difficult for the user of the roadway to see what is beyond them.

CONTROLLED LOCAL BRIGHTNESS

There have been suggestions in regard to various forms of local lighting (*e.g.*, restricted beams of light.) Experience seems to have proved the fundamental value of a *uniform level of illumination* with, so far as possible, no regions of complete darkness.

The measure of illumination provided by war-time street lighting, though so small, is of appreciable benefit, especially when applied on a large scale. It affords a ground work on which the eye can build up impressions from any extra casual light it may receive.

It would, however, add to amenities in the streets if somewhat *higher illuminations,* under proper control, or suitably screened, could be adopted *locally* in certain instances.

ANNOTATION

The Empty Socket

It has often struck us as odd that one does not find an ophthalmological subject used as an Inn sign in this country, but we do not know of a single case. Other anatomical subjects occur: *e.g.*, the hand often, the heart, occasionally. St. Peter's finger is met with in one instance. Arms are, of course, frequently found in this connexion, but here the significance is heraldic and not anatomical. The eye is very rarely met with in heraldry as we have observed before.

Care would be needed in giving an ophthalmic name to a pub, for if the house were called the "evil eye" the more superstitious of the village inhabitants would give it a wide berth. And "the squinting eye" would almost certainly become in local parlance the "boss eye" and from that to "boozy," the transition is easy. Hardy would seem to have anticipated in a mild degree our need, for one of the village inns in "Tess" was called the "Pure Drop." We fear that in this case he was thinking of a drop of drink and not of an eye drop.

The late Mr. George Pollock, in lecturing on fractures at St. George's Hospital more than half a century ago, used to tell an apocryphal story of a certain publican who changed the name of his

house from the "crooked billet" to the "crooked arm." This was done to annoy the local doctor who had had a bad result in the treatment of a case of fracture in one of the publican's children. The results on the practice were said to have been disastrous and the doctor had to leave the district. Fortunately for us the eye hardly lends itself to such a theme. We suggest our heading as a possible sign for an inn in the hope that some eminent English artist may feel inclined to draw a portrait of the oldest inhabitant minus one eye.

ABSTRACTS

MISCELLANEOUS

(1) **Powell, L. S. and Smith, H. S. (Lawrence and Osawatomic, Kansas).—Eye studies following lumbar puncture.** *Amer. Jl. of Ophthal.*, Vol. XXIII, p. 792, 1940.

(1) **Powell** and **Smith** report their investigations on visual acuity, intra-ocular pressure, blood pressure and ophthalmoscopic appearances of the fundus and disc in 56 patients whose ages ranged from 16 to 62 years, 34 were males and 22 females.

There seems to have been no appreciable change in visual acuity, intra-ocular pressure and blood pressure after lumbar puncture. In 16 patients hyperaemia of the disc was noted, which in most cases the authors state was mild and non-persistent, but in some it was quite marked and persistent. Slight papilloedema was noted in three patients and of these one had no symptoms, one complained of headache and the other had nausea and headache.

H. B. STALLARD.

(2) **Burke, T. W. (Washington).—Field changes after satisfactory filtration operations for glaucoma.** *Amer. Jl. of Ophthal.*, Vol. XXIII, p. 657, 1940.

(2) **Burke** has examined the visual field changes for five years or more in 48 patients with glaucoma who underwent some form of filtration operation, and in none of whom was the intra-ocular pressure above 26 mm. Hg as assessed by a Schiötz tonometer. Subacute, chronic and secondary glaucoma due to uveitis are included in the series. Either Lagrange's operation or Elliot's trephine was performed in all cases.

After a successful filtration operation 50 per cent. showed further

field loss over a long period of years, but most of them retained central fixation and useful vision. The author considers that the rate of field loss was not so rapid as it would have been had the patients not been operated on. He sees no justification in hesitating to operate when the field defect is adjacent to the fixation point for although central vision may occasionally be lost, useful vision is retained in the majority of cases and the visual field defect checked.

The best results as regards post-operative retention of visual fields are in those cases in which little loss has occurred before operation. Neither age nor low tension after operation had any relationship to the field changes. The author discusses possible causes such as stretching of the nerve fibres over the edge of the excavated optic disc, a progressive degenerative process, ischaemia and direct pressure on the retina.

H. B. STALLARD.

(3) **Barkan, H. (San Francisco).—Use of the Shahan thermophore in hypotony of the eyeball as a result of the Elliot trephining operation.** *Amer. Jl. of Ophthal.*, Vol XXIII, p. 692, 1940.

(3) **Barkan** describes a use for the Shahan thermophore in the treatment of hypotony following Elliot's trephine operation for glaucoma. The small tip of this instrument is applied at a temperature of 165° to 170° F. to various points on the bleb for 5-10 seconds, an interval of a few seconds being allowed to elapse before re-applying the tip at another point. This procedure is repeated at intervals of several days. The author claims that it is effective in making the trephine bleb dense and flatter, and in raising the intraocular pressure.

H. B. STALLARD.

(4) **Albus, E. C. (Champaign, Illinois).—Benign melanomas of the choroid and their malignant transformation.** *Amer. Jl. of Ophthal.*, Vol. XXIII, p. 779, 1940.

(4) **Albus** comments on the greater frequency of benign melanomata of the choroid than is generally supposed. He found this new growth 26 times in 2,300 (1-88) patients, higher than the incidence of malignant melanoma. Benign melanomata are usually in the posterior half of the fundus, are oval or circular in shape, and vary from ½ to 4 optic disc diameters. They have a definite edge, there is no marginal pigmentary disturbance or light fringe, and no measurable retinal elevation. They may be multiple. There were no field defects in eight of the author's cases.

Benign melanomata are composed of congenital circumscribed accumulations of chromatophores, uniform dense pigment in the outer layers of the choroid, spindle-shaped cells in the centre and

round at the periphery. The cells are densely pigmented, the nuclei are fairly well seen, there is no extra-cellular pigment, the chorio-capillaris is not involved. The choroid is increased in thickness at the site of the lesion and the retinal pigment epithelium is normal. The origin of the benign melanomata is considered to be neuro-ectodermal.

The author describes the case of a female, aged 60 years, in whose amblyopic left eye a benign melanoma in the upper half of the retina had been noted eight years previously. This became malignant and the patient presented herself on account of secondary glaucoma. The diagnosis was confirmed by pathological examination and she died two years after excision of the eye.

The author comments that the clinical signs of malignancy may be recognised by stippling and irregular pigmentation over the neoplasm.

H. B. STALLARD.

(5) **Henderson, J. W. and Benedict, W. L. (Rochester, Minnesota). Essential progressive atrophy of the iris.** *Amer. Jl. of Ophthal.*, Vol. XXIII, p. 644, 1940.

(5) **Henderson** and **Benedict** report the case of a rare disorder, essential progressive atrophy of the iris, which affects young adults, particularly females, and is unilateral.

The case described was a nervous male, aged 32 years, whose left pupil at first became displaced to the temporal side and then took the shape of an oval horizontal slit. The iris was light greenish-grey. At the extremities of the oval slit in the 9 o'clock-3 o'clock meridian the iris was about 1 mm. wide and was drawn towards the limbus by band-like tissue, and in this meridian the ectropion uveae was widest. In the majority of cases, glaucoma supervenes in one to eight years after the onset of atrophic changes.

Peripheral synechiae, most developed where the pupil is pulled towards the limbus, contribute to the progress of the disease. The cause of this disorder is at present unknown.

H. B. STALLARD.

(6) **Corboy, P. M. (Valparaiso, Indiana). — Simplifying the Dupuy-Dutemps operation. (Dacryocystorhinostomy).** *Amer. Jl. of Ophthal.*, Vol. XXIII, p. 810, 1940.

(6) **Corboy** comments on the necessity for suturing the mucosa of the lacrymal sac and the nose at the site of anastomosis and on the technical difficulty of this procedure.

He believes that a strong anterior covering of the ostium is important, and to effect this he fashions two tongue-shaped flaps, one in the nasal mucosa has its base above and its apex below and

the other in the lacrymal sac has the base downwards and the apex of the tongue above. These two tongue-shaped flaps are united by two 000 catgut sutures, the ends of which are knotted to prevent each suture from being pulled through its hole, the free ends of each suture are then tied.

Twenty-two patients have been operated on by this method over approximately two years, and 18 (82 per cent.) have been successful.

H. B. STALLARD.

(7) **Tristaino (Padua).—A case of congenital lengthening of the lower canaliculus. (Un caso di "elongatio canaliculi lachrymalis inferior congenita").** *Rass. Ital. d'Ottal.*, January, 1939.

(7) This is a rare anatomical peculiarity. It was described first in 1916 by van der Hoeve. The case here detailed was a child aged three years; the parents had noticed persistent lacrimation. Both the lower lids were slightly everted; the space between the internal canthi was larger than normal. The inner parts of the lids were united, internal ankyloblepharon. The lower puncta lacrimalia were abnormally far out and did not dip into the lacus lacrimalis. The outer third of each lower lid was in a position of ectropion. The length of the lower canaliculus, measured by a Bowman's probe was 12 mm., that is about 5 mm. longer than usual. The root of the nose seems broader than normal. The method of production of the deformity is not clear, but it must depend on some defect in the development of the lacrimal apparatus and of the tarsal plate of the lids. **Tristaino** discusses the question at some length.

HAROLD GRIMSDALE.

(8) **Bogoslovsky, A. I. (Moscow).—The dependency of the contrast sensitivity of the eye upon adaptation.** *Ophthalmologica*, Vol. XCVII, p. 289, 1939.

(8) **Bogoslovsky** reports a series of experiments on the influence of light and dark adaptation upon the differential thresholds of brightness in the blue, green, red and white lights for foveal vision and concludes that:—

1. For a low level of brilliance of the test field (less than 1 lux on white), the differential thresholds diminish during dark adaptation, whereas during light adaptation they heighten.

2. When the brilliance of the test field increases up to a few lux on white, the differential threshold for the blue, red and white light in the dark heightens and in the light decreases; for green light, however, it remains practically unchanged.

3. In a greater heightening of brightness of the test field up to

several hundred lux on white, the same regularity reported in paragraph 2 for blue, white and red also holds good for green.

4. The established regularities of change in the differential thresholds permit one to raise the question concerning the mechanism of the central regulation of the contrast sensibility and how it is differentiated from its peripheral mechanism.

ARNOLD SORSBY.

(9) **Myerson, Abraham and Thau, William (Boston).—Ocular pharmacology of furfuryl trimethyl ammonium iodide.** *Arch. of Ophthal.*, October, 1940.

(9) Furfuryl trimethyl ammonium iodide is a new para-sympathetic drug which is very stable in the blood and produces a marked fall in blood pressure, cardiac inhibition, an increase in flow of saliva, and in the tone of the intestine and bladder. It is not synergic with prostigmine, probably because cholinesterases have no effect on its chemical structure. Instilled into the eye in a strength of 10 per cent., it produces miosis in 2-4 minutes, the maximum effect being reached in 5-7 minutes. The anterior chamber becomes shallow in the centre owing to accommodative spasm, the peripheral part being unaffected. Intra-ocular pressure begins to fall in 8-10 minutes, and the maximum effect is produced in about an hour, lasting for 12-24 hours. In view of these findings, **Myerson** and **Thau** consider that this drug should be useful in glaucoma.

F. A. W-N.

(10) **Berliner, Milton L. and Gartner, Samuel (New York).—Hypertelorism.** *Arch. of Ophthal.*, October, 1940.

(10) Hypertelorism is a congenital anomaly of the skull and face, characterised by a wide separation of the orbits and usually complicated by the presence of a divergent squint. The condition appears to have been known for a long time and **Berliner** and **Gartner** reproduce a copy of a drawing by Giovanni Battista of a typical case in 1586, which bears quite a resemblance to some modern efforts at portraiture. The case they report occurred in a woman aged 31 years, who had an interpupillary distance of 84 mm. and a divergent squint of 140 prism dioptres. The right disc was pale, and the retinal vessels were attenuated, with resulting loss of visual acuity, constriction of field and the presence of central scotoma. The left eye was unaffected though both optic foramina were contracted, the right measuring 2×4 mm. and the left 3×3 mm. Anatomically, hypertelorism is thought to be due to excessive size of the lesser wings of the sphenoid. The condition is usually

an isolated one, with no familial incidence, though it may be associated with other congenital anomalies.

F. A. W-N.

(11) **Thau, William and Myerson, Abraham (Boston).—Effect of iontophoresis on the eye.** *Arch. of Ophthal.*, October, 1940.

(11) **Thau** and **Myerson** find that iontophoresis with water or normal saline produces a lowering of intra-ocular pressure. When the positive electrode is used, the effect lasts for 5-7 days; with the negative electrode it lasts 6-9 days. The technique is as follows:—A specially draped, spoon-like copper electrode, well covered with cotton wool and thoroughly moistened with normal saline is placed in the lower fornix and kept in contact with the lower part of the eyeball. Care should be taken not to touch the cornea, or clouding may result. The current is from 5-10 milliamperes and is applied for a period of 8-10 minutes. Some local hyperaemia is produced in the bulbar conjunctiva which disappears in a few days and is of no pathological importance. Since a reduction of tension occurs irrespective of whether the positive or negative electrode is used, the authors consider that the effect is possibly due to stimulation of the ciliary muscle associated with increased blood flow.

F. A. W.-N.

(12) **Gradle, H. S. and Sugar, H. S. (Chicago).—Concerning the chamber angle.** *Amer. Jl. of Ophthal.*, Vol. XXIII, p. 982, 1940.

(12) **Gradle** and **Sugar** review extensively the literature on exfoliation of the anterior lens capsule. They discuss its relationship with secondary glaucoma and its incidental presence in association with primary glaucoma. They conclude that the disease is a senile degenerative disorder, involving the vitreous and its derivatives, the zonule fibres and the zonular lamella. It is evident that in some cases the vitreous is particularly fluid, and in three of the author's cases, synchysis scintillans was present.

Dense nuclear sclerosis and cortical opacities are common. If cataract extraction should become necessary it is important to do the extra-capsular operation and not the intra-capsular on account of the degenerative nature of the vitreous.

The incidence of secondary glaucoma is discussed, and its progressive nature associated with a relative small rise of intra-ocular pressure, 22 to 25 mm. Hg, is commented upon. Miotics may afford temporary control, but a number of cases require surgical intervention; Elliot's corneo-scleral trephine, cyclodialysis and iridencleisis are the operations more commonly practised.

The histology of exfoliation of the anterior lens capsule is

described and illustrated by six microphotographs. The clinical features of this disorder and the structures affected in association with it are dealt with in detail.

H. B. STALLARD.

(13) **Stallard, H. B. (London).—An operation for epiphora.** *Lancet*, December 14, 1940.

(13) **Stallard's** operation is designed to relieve the epiphora which so constantly results from fibrous obstruction in the canaliculi particularly after traumatic severance of the canals at the region of the inner canthus.

Under local anaesthesia the lacrymal sac is exposed through the usual incision. The fundus of the sac is dissected free from adjacent tissues and, together with the medial wall, separated from the lacrymal fossa. A suture of fine black silk is passed through the fundus and the sac drawn laterally and slightly forwards to find out if it will come into the inner canthus without undue tension. Next an oblique stab incision 5 mm. long is made with a double-edged knife in the lacus lacrymalis and carried downwards and backwards to emerge at the centre of the lacrymal fossa. After withdrawing the knife a pair of fine forceps is passed along the new route made and made to seize the stitch in the fundus of the sac. The sac is then gently retracted laterally and forwards so as to expose the orbital fascia behind it. This is incised vertically to allow the orbital fat to herniate into the lacrymal fossa and form a soft pad occupying the space between the new oblique position of the sac and the bony wall of the fossa. The sac is drawn upwards and outwards through the incision until 3 mm. of the fundus projects into the inner canthus. It is essential that the sac should not be under tension or kinked, but lie in a plane inclined downwards, medialwards and backwards.

A fine hook is passed into the lower punctum and traction made downwards to evert the lid margin near its termination at the inner canthus. Four sutures of black silk on half circle arterial needles are inserted through the wall of the sac and the conjunctiva midway along the posterior and anterior lips of the conjunctival incision and and at its medial and lateral extremities. The summit of the fundus is then cut off and the patency of the naso-lacrymal duct tested by gently passing a probe. The incision for exposure of the sac is closed in the ordinary way and a dressing applied.

The results were most satisfactory.

Two illustrations show clearly the method of procedure.

R. R. J.

BOOK NOTICES

Thirteenth Annual Report of the Memorial Ophthalmic Laboratory, Giza, Cairo. Cairo: Schindler's Press. Price, P.T. 35. 1938.

R. P. Wilson, who has been Director of the Memorial Ophthalmic Laboratory of Egypt since its inauguration, is responsible for this admirable report on the teaching and pathological work carried on under his direction. A wealth of material is obtained from the 68 permanent hospitals or ophthalmic sections of general hospitals, together with the 15 travelling ophthalmic hospitals under canvas. It is improbable that any ophthalmic laboratory in the world can have had the opportunity of examining 74 malignant tumours of the eye and its adnexa in a single year.

Considerable attention has been paid to the treatment of trachoma by the sulphonamides. Their effect on palpebral manifestations is disappointing; such improvement as, on occasion, may occur is due to their action on the element of mixed infection. As regards the results obtained from the action of the different varieties of the sulphonamides one cannot say that any one gave better results than another; the result in all cases was unsatisfactory.

However, there is a different story to tell when the drug is used to treat the recurrent attacks of trachomatous keratitis, which are common in the East. Here the results, at any rate the immediate ones, are excellent.

The course of Koch-Weeks conjunctivitis did not appear to be shortened by the administration of sulphonamides, although acute gonococcal conjunctivitis responded most satisfactorily.

Spring catarrh is very common in Egypt, of course in conjunction with trachoma. This has been under investigation by the Director's assistant, Maxwell Lyons, whose researches have been recorded in this Journal in previous years. He has no doubt that the condition is a local manifestation of some general disorder, putting it into a category beyond the normal province of the ophthalmologist as regards its aetiology and radical treatment; an opinion which is not universal.

CORRESPONDENCE

TRACHOMA IN SOUTH AUSTRALIA

To the Editors of THE BRITISH JOURNAL OF OPHTHALMOLOGY.

SIRS,—The letter, following from Sir James Barrett seems of sufficient importance to justify publication, especially in view of the

last paragraph dealing with trachoma in Southern Australia. It is very satisfactory to hear that it is, there, a disappearing disease.

Yours truly,

HAROLD GRIMSDALE.

DEAR MR. GRIMSDALE,—In the third edition of your Ophthalmic Operations their appears a kindly notice of the operation for entropion by Orr and myself.

It resulted from a visit to the East and experience of the Anagostakis operation. Your criticism that the sliding down of the upper lid might leave a raw edge is natural and occurred to us. But as a matter of fact it does not occur, and the real difficulty is to slide down sufficiently. After a very short time the readjustment occurs.

I have done very many of these operations which can be repeated if necessary and have never felt inclined to perform any other.

But trachoma is now in Southern Australia a disappearing disease for some reason, but when years ago I commenced practice it was the disease which took most of my time. It still exists in some quantity in the western part of New South Wales and Queensland which are very dry, dusty and at times arid.

Sincerely yours,

JAMES W. BARRETT.

MELBOURNE,
December 2, 1940.

NOTES

American Journal of Ophthalmology

DR. LAWRENCE T. POST retired from the post of editor in chief of the *American Journal of Ophthalmology* at the end of last year. Dr. Post has held his important post for nearly ten years. He is succeeded by Dr. Derrick Vail. We send our best wishes to Dr. Vail and to the Journal.

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Research in Ophthalmology

IT was recently announced that Lord Nuffield has given £25,000 to the University of Oxford in order to encourage research in ophthalmology. We understand that a Research Assistant is to be appointed to the Margaret Ogilvie Reader in Ophthalmology, and at the same time equipment and other facilities for the conduct of research will be provided. This is a matter for congratulation and the hearty thanks of British ophthalmology will go out to Lord Nuffield for his generosity.

Ophthalmological Society of Egypt

THE Annual Congress of the Ophthalmological Society of Egypt will be held in the Memorial Ophthalmic Laboratory, Giza, on Friday and Saturday, March 14 and 15, 1941. The symposium for the congress will be:—1. Soliman Lecture, on Blepharitis. 2. Glaucoma.

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Hyoscine

REFERRING to the present shortage of some of our essential drugs for ophthalmic purposes a writer in the "Scotsman" of December 7, 1940, states that henbane (*hyoscyamus niger*) used to grow profusely on the west side of the island of Inchkeith, 23 years ago. He also gives a reference to Sowerby's "English Botany" which mentions Inchkeith as one of the few places in Scotland where henbane grows plentifully. In the same paper of December 11, occurred the following further reference to hyoscine and Inchkeith, which we take the opportunity of printing in full with acknowledgments to the Editor of "The Scotsman."

HYOSCINE

Edinburgh, December 11, 1940.

The Captain of the Guard inquired in vain for Gunner Reith,
And circulated data on his eyes and hair and teeth;
Exhaustive searching brought to light he'd taken boat from Leith,
And gone to gather henbane on the west slopes of Inchkeith,
"Don't you know there is a war on?" the Captain roared in spleen,
The Gunner just regarded him with grave and thoughtful mien—
"It was the M.O.'s birthday, Sir, you know Sir, Major Green,
I thought he'd like some henbane to prepare some hyoscine!"

I am, &c.,

S. L. W.

FUTURE ARRANGEMENTS

1941

March 1, 1941.—North of England Ophthalmological Society, at Liverpool.

March 29, 1941.—North of England Ophthalmological Society, at Sheffield.